FORM 4 TERM 1 OPENER
CHEMISTRY

NAME……………………………………………… ADM NO……………..

CLASS………………………………………… SIGN…………………..

INDEX NO…………………………………. DATE……………………

233/2
CHEMISTRY
PAPER 2
TIME: 2 HOURS

Attempt all the questions in the spaces provided.

1. The diagram below shows chromatograms for five different dyes.
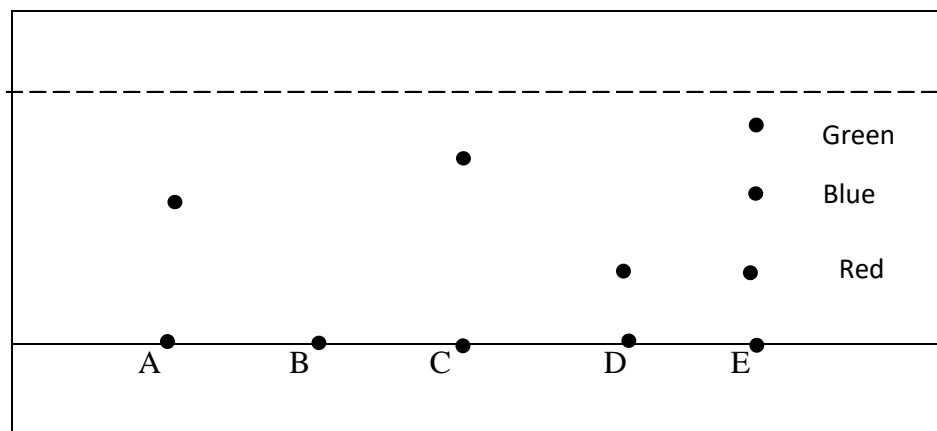
(a) Name the technique used to separate the dyes. (1 mk)

(b) What conditions are required to separate the chromatograms present in a dye? (2 mks)

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(c) What is meant by the term solvent front? Indicate its position in the diagram.   (1 ½ mks)

(d) Which chromatogram were present in dye D.   (1 mk)

(e) Which dye is insoluble?   (1 mk)

(f) Which dye is pure? Explain.   (1 ½ mks)

(g) Which chromatogram is most soluble?   (1 mk)

(h) How can one obtain the extract of the blue dye?   (2 mks)

(i) The results showed that dye E contained unwanted colour. Identify the colour.   (2 mks)

2. Air was passed through several reagents as shown in the flow chart below.

Gas P
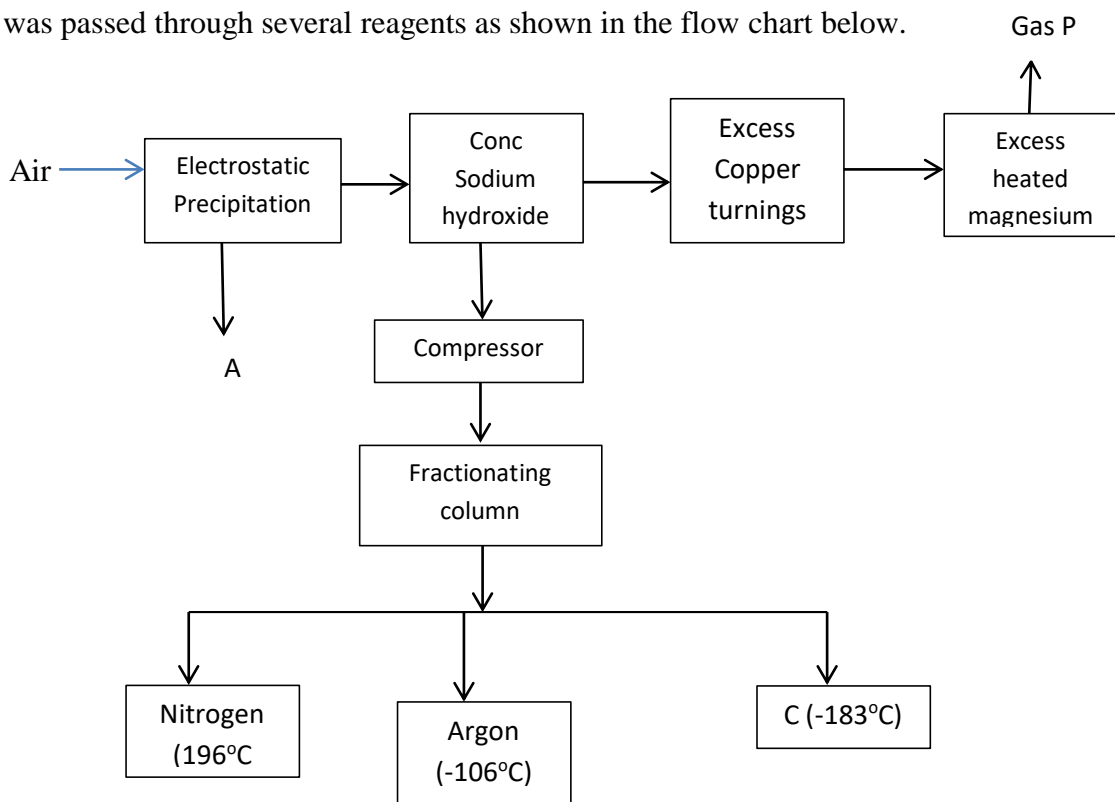
(a) Write an equation for the reaction which takes place in the chamber with.
   (i) Concentrated Sodium hydroxide.   (1 mk)

   (ii) Excess heated copper turnings.   (1 mk)

   (iii) Excess heated magnesium   (1 mk)

   (iv) Name one gas which escapes from the chamber containing magnesium powder. Give a
        reason for your answer.   (2 mks)

(b) The diagram below shows an experimental set up for the laboratory preparation of nitrogen
    gas.

(26)
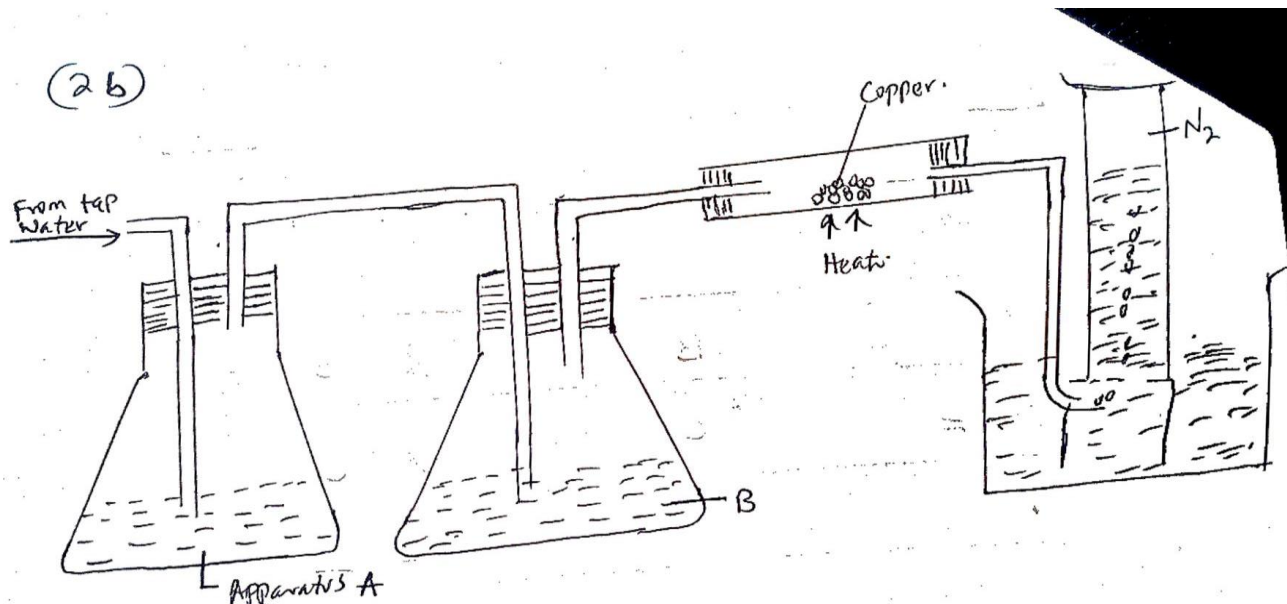
(i) Name the reagent B and state its role. (2 mks)

(ii) What is the observation made in the combustion tube? (1 mk)

(iii) Nitrogen gas collected using this method is not pure. Explain. (1 mk)

(iv) Give a reason why liquid nitrogen is used for storage of semen for artificial insemination. (1 mk)

3. Use the grid below to answer the questions that follow. The letters do not represent actual symbols of the elements.

F										
					Q					
O			B	P			R	S	A	
T	E		C					U		
V								Z		

(a) (i) Which element form ions with a charge of -2? Explain. (2 mks)

(ii) Identify and explain the elements with great tendency of forming covalent compound. (2 mks)

(b) How do the reactivity of the following elements compare? Explain.
   (i) T and V   (2 mks)

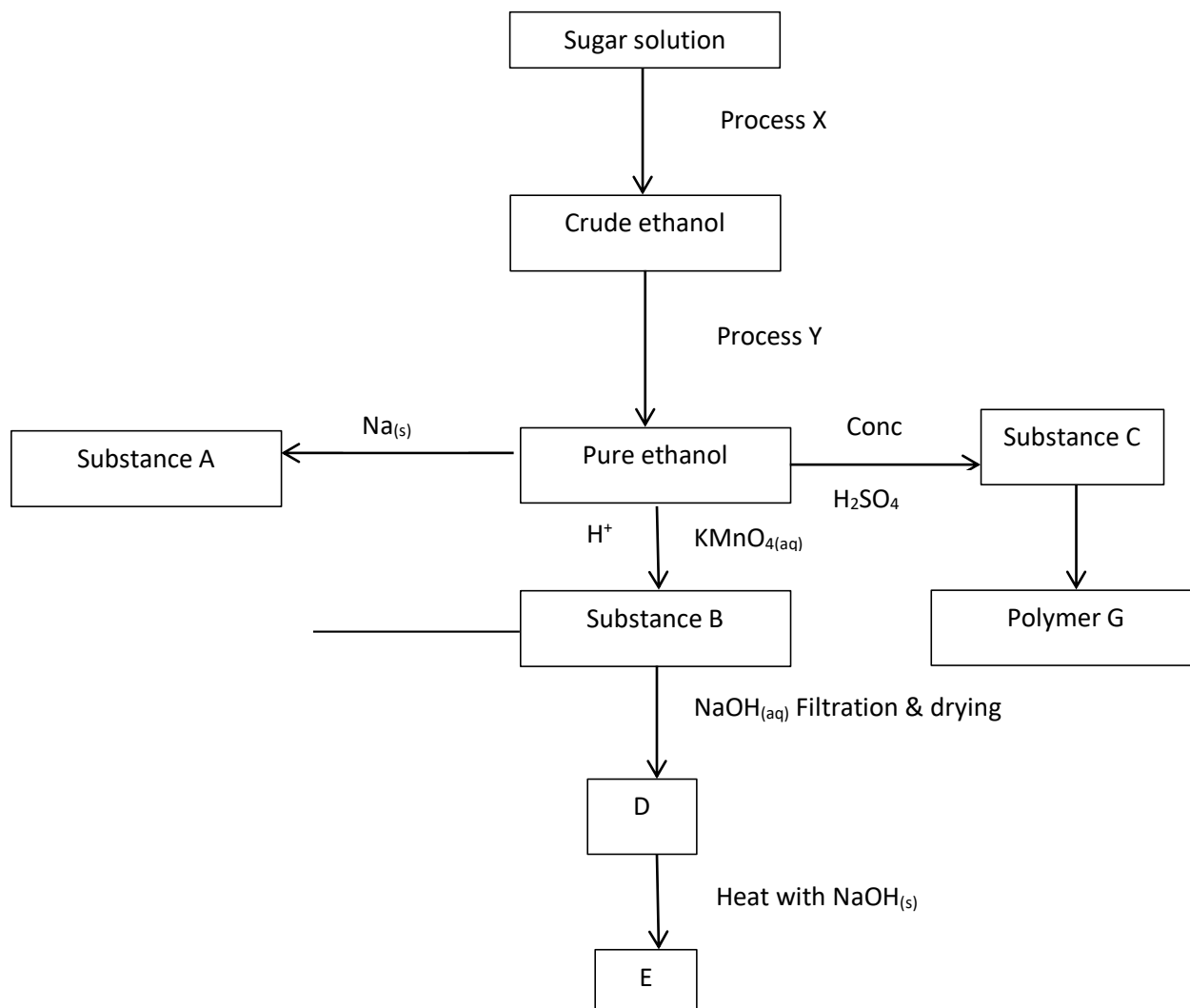   (ii) T and E   (2 mks)

   (iii) S and Z   (2 mks)

   (iv) Select the element with the largest atomic radius. Give a reason.   (2 mks)

4. Study the flowchart below and answer the questions that follow.

```
                        ┌─────────────────┐
                        │  Sugar solution │
                        └─────────────────┘
                                 │
                             Process X
                                 ▼
                        ┌─────────────────┐
                        │  Crude ethanol  │
                        └─────────────────┘
                                 │
                             Process Y
                                 ▼
┌──────────────┐  Na(s)  ┌─────────────────┐   Conc    ┌──────────────┐
│ Substance A  │◄────────│  Pure ethanol   │──────────►│ Substance C  │
└──────────────┘         └─────────────────┘  H₂SO₄    └──────────────┘
                           H⁺  │                               │
                               │ KMnO₄(aq)                     ▼
                               ▼                        ┌──────────────┐
                        ┌─────────────────┐             │  Polymer G   │
                ────────│  Substance B    │             └──────────────┘
                        └─────────────────┘
                                 │
                        NaOH(aq) Filtration & drying
                                 ▼
                            ┌───────┐
                            │   D   │
                            └───────┘
                                 │
                         Heat with NaOH(s)
                                 ▼
                            ┌───────┐
                            │   E   │
                            └───────┘
```

(a) Identify substances A, B, C and E.   (2 mks)

A –

B –

C –

D –

(b) Identify process X and Y.   (1 mk)

X –

Y -

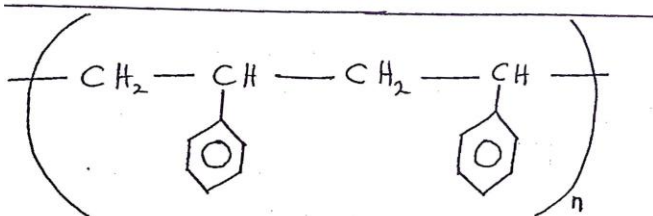(c) Write chemical equations to show how substance E may be obtained from B.   (2 mks)

(d) Draw the structure of;   (2 mks)
   (i) Polymer G

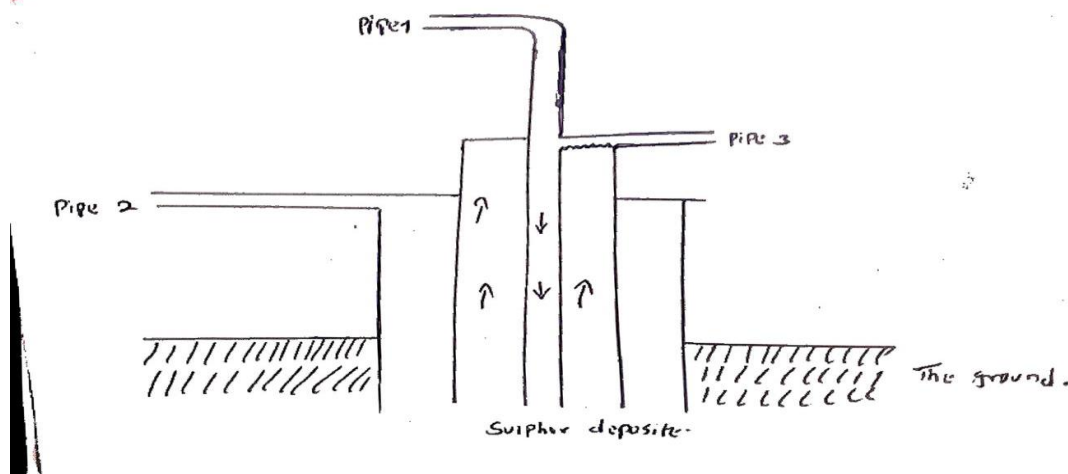   (ii) The repeating unit of polymer G

(e) A polymer is represented by:

   (i) Draw the structure of the monomer.   (1 mk)

   (ii) A sample of the polymer was found to have relative molecular mass of 3952. Determine
        the volume of n. (H = 1.0, C = 12.0)   (2 mks)

   (iii) State one demerits of this kind of polymer as a synthetic fibre.   (1 mk)

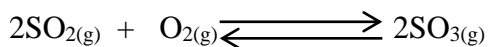5. The diagram below shows the extraction of Sulphur by the Frasch process.

(a) State what passes through pipe 1 and 3. (2 mks)

1

3

(b) Give the purpose of the solution that passes through pipe 2. (2 mks)

(c) The following equation is the reaction of Sulphur (iv) oxide and oxygen gas. Use it to answer the questions below.

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)}$$

(i) Name the catalyst used for this reaction. (1 mk)

(ii) Explain briefly how Sulphur (vi) oxide is converted to Sulphuric (VI) acid in the contact process. (2 mks)

(e) (i) State two effects of Sulphur (iv) oxide on the environment. (2 mks)

(ii) When ammonia is passed through concentrated Sulphuric acid, ammonium sulphate fertilizer is produced.

    I. Write an equation for the reaction.   (1 mk)

    II. Calculate the mass in kg of Sulphuric acid required to produce 250kg of the ammonium sulphate fertilizer ($S = 32.0$ $O = 16.0$, $N = 14.0$, $H = 1.0$) (3 mks)

6. A sample of hydrated Iron (II) sulphate weighing 6.8g was dissolved in water and the solution made up to $250cm^3$. $25cm^3$ of the solution was titrated against a solution of 0.02 molar acidified potassium manganite (VII). The titre volumes obtained were $22.8cm^3$, $22.4cm^3$ and $22.5cm^3$ for the first, second and third titrations.

(a) (i) Complete the following table.   (3 mks)

Final burette reading (cm^3)	1_____	2_____	3_____
Initial burette reading (cm^3)	0.00	0.00	22.4
Total titre volume (cm^3)	4_____	5_____	6_____

(ii) Determine the average titre volumes   (1 mk)

(b) Determine the number of moles of manganese (VII) ions used.   (2 mks)

(c) Calculate:
(i) The concentration of the iron (II) sulphate in mol/dm^3 (molar mass $= 278$)   (1 mk)

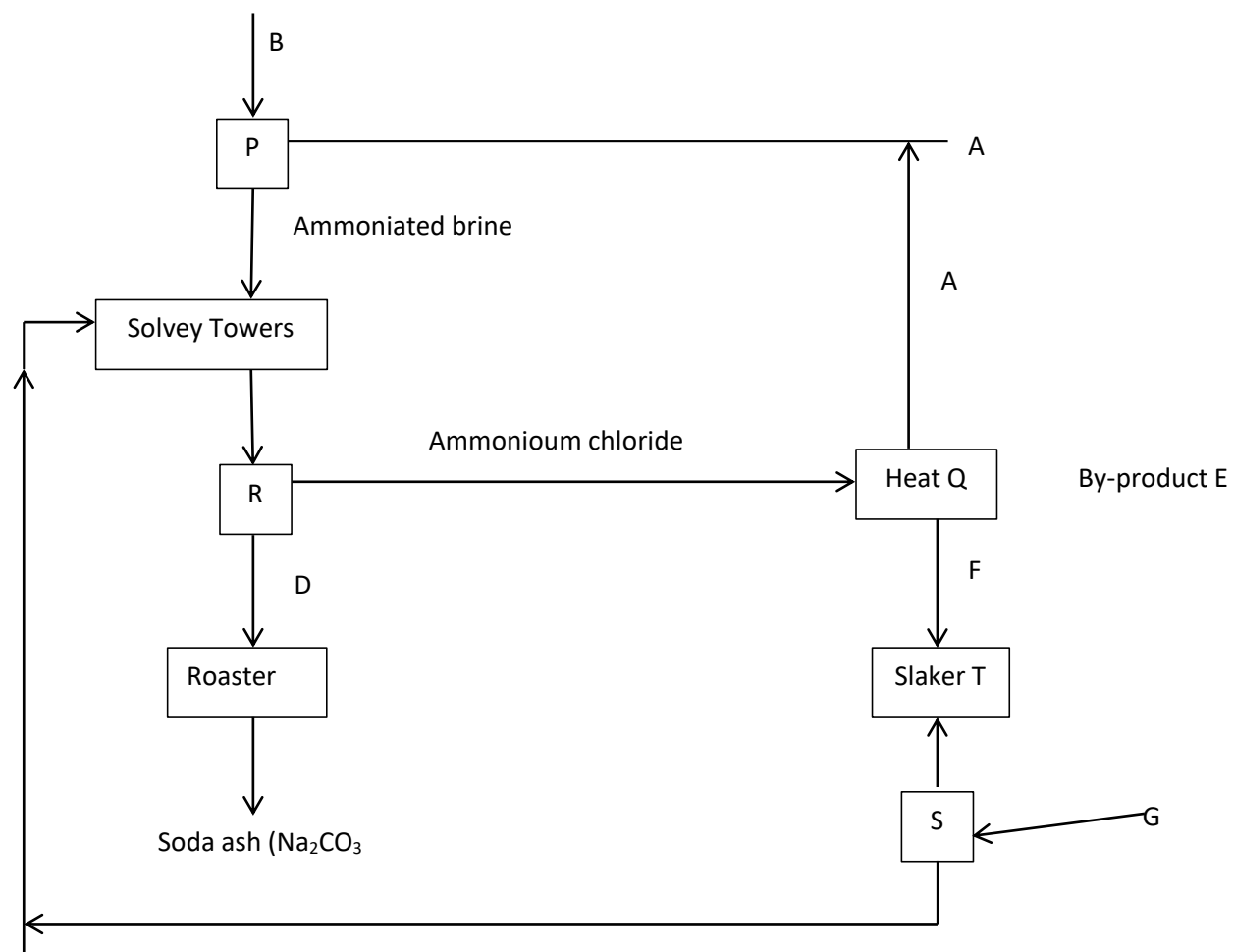## FOR MARKING SCHEMES CALL/WHATSAPP 0705525657

(ii) Moles of iron (II) ions in 25cm^3 of solution. (2 mks)

(e) An indicator is not required for this titration. How can the end point be determined?
(2 mks)

7. The table below shows industrial manufacture of sodium carbonate. Study it and answer this questions that follow.

(a) Name the raw materials A and B. (2 mks)

(b) Write equations for the reactions taking place at Q and S. (2 mks)

Q –

S –

(c) Name recycled substances and include equations for the reactions. (2 mks)

(d) Name processes S and R. (2 mks)

(e) Name by-product E. (1 mk)

(f) Name substance D. (1 mk)